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Detailed Report

(Name of invention)

a touch panel control device

Abstract

(Object)

In the field of touch panels made from resistance sheets, this invention offers a touch panel control device which notifies the user immediately when calibration is necessary due to the fact that the resistance of the resistance sheet is changed by environmental change or due to aging causing a discrepancy in the position detection.

(Construction)

When the resistance value of the sheet is measured when the power is applied, if the resistance value is different from the last time, the device automatically enters the calibration menu. It also outputs a message that it needs calibration.

(Effects)

The user always knows that calibration is necessary, and calibration can be done quickly. Therefore, it is possible to minimize mistaken input due to discrepancy in the position detected.

Sphere of the patent application

(Claim 1)

Claim 1 is regarding a touch panel control device which has the following characteristics: It is a resistance type touch panel. A standard resistance is connected in series with the touch panel. It measures the resistance value of the sheet when power is applied. When the resistance value differs from the last time by more than a certain value, the device outputs this information.

Detailed explanation of the invention

[0001]

(Field of industrial use)

This invention is regarding a touch panel control device which uses a resistance sheet which is often used in information portable terminal devices.

[0002]

(Prior art)

Touch panels that use the resistance sheet have a characteristic that their resistance values change due to changes in the environment (temperature, humidity) and as they age. With the controlling device for the former touch panel, the user does not know when position detection is erroneous due to a change in the resistance value. They find out about an erroneous position detection only after making many wrong inputs. After the user finds out by making many errors, the device is calibrated.

[0003]

(Problems that this invention tries to solve)

However, with the former method, when the resistance value changes users were not quickly aware of the erroneous position detection. This is very hard for users to use.

[0004] Therefore, the object of this invention is to offer a touch panel control device which can completely eliminate the former problems.

[0005]

(Steps for solution)

In this invention, in order to solve the above problems, the resistance value of the sheet is measured when power is applied. When the resistance value is different than the resistance value from the last time by more than a certain value, the device outputs this information.

[0006]

(Function)

This invention makes the user aware of the need for calibration immediately when it detects a change in resistance.

[0007]

(Example of practice)

In the following, a touch panel control device in one example of practice of this invention is going to be explained using figures. Figure 1 shows the hardware of a touch panel in one example of practice of this invention.

[0008] In figure 1, 11 is the CPU (central processing unit) which controls various devices in accordance with the program entered in the ROM 12. 13 is RAM for storing the last resistance value, etc. 14 is a display device such as an LCD, etc. 15 is a drive circuit for the touch panel. 16 is an A/D transformer for transforming the analog output of the touch panel into digital information. 17 is a touch panel which uses the resistance sheet method using a pen for input.

[0009] Figure 2 is a detailed circuit diagram of the drive circuit of the touch panel in one example of practice of this invention.

[0010] In figure 2, TR1 and TR2 are transistors for driving the resistance sheet in the X direction. TR3 and TR4 are transistors for driving the resistance sheet in the Y direction. R1 is the standard resistance for detecting the resistance value in the X direction. R2 is the standard resistance for detecting the resistance value in the Y direction. These standard resistances R1, R2 are highly accurate, and they are very stable with respect to changes in environment or aging.

[0011] Figure 3 is a flow chart which indicates the operation of the touch panel in one example of practice of this invention.

[0012] In the following, use of this invention is going to be explained using the flow chart in figure 3. When the power electric source is turned on (S1), the CPU 11 measures the current resistance value. Explaining further, in order to measure the resistance value of the resistance sheet in X direction, the CPU11 turns on TR1 and TR2 in figure 2, and it applies 5V to the resistance sheet in X direction. By doing so, the voltage is divided by R1 which is a standard resistance and the sheet resistance in the X direction. This is detected by the A/D transformer 16. The resistance value of the sheet is detected by this voltage. Next, in order to detect the resistance value of the sheet in the Y direction, the same procedures are performed, and the resistance value of the sheet in the Y direction is detected. (S2) The resistance values of the sheet in the X direction and the Y direction which have been detected in S2 are stored in RAM 13 for reference. (S3) The last resistance value is read from RAM 13 and compared with the current resistance value. (S4) The controller checks to see whether the last resistance value agrees with the current resistance value within a certain range. (S5) If they agree within the limits, the controller enters the start-up menu. (S10) If the resistance values compared in S5 do not agree within the limits, the controller outputs a message that the LCD needs to be calibrated (S6) and automatically enters the calibration menu. (S7) At this point, users are aware of the fact that calibration is necessary, and they perform calibration. (S8) When calibration

is complete (S9), the controller enters the conventional start-up menu. (S10) A program which follows this flow chart is stored in ROM 12.

[0013] Although a message output to a panel is specified in the above example of practice, it is possible to indicate the need for calibration by an LED as other methods.

[0014]

(Effects of this invention)

As explained above, according to touch panel control device of this invention, the user automatically knows when calibration is necessary, and calibration can be done quickly. Therefore, it is possible to minimize mistaken input due to erroneous position detection.

(Simple explanation of figures)

Figure 1 shows the hardware of a touch panel in one example of practice of this invention.

Figure 2 is a detailed circuit diagram of the drive circuit of the touch panel in one example of practice of this invention.

Figure 3 is flow chart which explains the operation of a touch panel in one example of practice of this invention.

(Explanation of symbols in figures)

11: CPU (central processing unit)

12: ROM

13: RAM

14: display device

15: drive circuit

16: A/D transformer

17: touch panel